भारतीय मानक
Indian Standard

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(Reaffirmed 2022)

जल एवं अपशिष्ट जल के नमूने लेना और परीक्षण (भौतिक एवं रसायनिक) की विधियाँ

भाग 6 गंध सीमा

(दूसरा पुनरीक्षण)

Methods of Sampling and Test (Physical and Chemical) for Water and Waste Water

Part 6 Odour Threshold

(Second Revision)

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Water Quality Sectional Committee, CHD 36

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Water Quality Sectional Committee had been approved by the Chemical Division Council.

This standard was first published in 1964 and subsequently revised and splitted in various parts in 1983. In the second revision of this standard, conditions for selecting panel members for testing of samples are included.

The ultimate odour testing device is the human nose. Odour tests are performed to arrive at qualitative descriptions and approximate quantitative measurements of odour intensity. The method prescribed here for intensity measurement is the threshold odour test. This method is applicable to samples ranging from nearly odourless natural waters to industrial wastes with threshold odour numbers in thousands. There are no intrinsic difficulties with highly odourous samples because they are diluted proportionately before being presented to the test observers.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

METHODS OF SAMPLING AND TEST (PHYSICAL AND CHEMICAL) FOR WATER AND WASTE WATER

PART 6 ODOUR THRESHOLD

(Second Revision)

1 SCOPE

This standard prescribes a consistent series method for the determination of threshold odour. This method is applicable to all types of water and waste water.

2 PRINCIPLE

The sample of water is diluted with odour-free water until a dilution of least definitely perceptible odour to each tester is found. The resulting ratio by which the sample has been diluted is called the threshold odour number (T.O.). As odour sensitivity differs with individuals and same person may also not be consistent, a panel of not less than five persons and preferably ten persons or more is recommended. As an absolute minimum two persons are necessary; one to make sample dilutions and other to determine threshold odour.

The following conditions should be considered while selecting panel members:

a) panel members shall not be suffering from any ailments that affect their perception of smell, such as cold, fever, sinusitis etc.
b) panel members should not engage in smoking, drinking (except water), and chewing gums/ sweet from 30 minutes before and during the testing.
c) panel members should avoid substances that can cause interference to smell, for example, perfumes, deodorants, cosmetics etc.

3 SAMPLE HANDLING AND PRESERVATION

Sample shall be collected in glass bottles with glass or tetrafluoroethylene lined closures. Plastic containers are not reliable for odour samples and shall not be used. Odour tests should be completed as soon as possible after collection. In case storage is necessary, collect at least 1 000 ml sample in a bottle filled to the top, refrigerate, and ensure that no extraneous odours are drawn into the sample.

4 INTERFERENCES

Chlorinated waters interfere with odour measurement. In such cases, dechlorination may be carried out by using sodium thiosulphate in exact stoichiometric quantity. Prepare a blank to which some amount of dechlorinating agent has been added to determine if any odour has been imparted. Such odours usually disappear upon standing if excess reagent has not been added.

5 APPARATUS

5.1 Odour Free Glassware

Glassware cleaned before use with non-odourous soap and acid cleaning solution followed by rinsing with odour free water.

NOTE — Rubber, cork and plastic stoppers should not be used.

5.2 Constant Temperature Bath

A water bath capable of maintaining a temperature of 60 ± 1°C.

5.3 Odour Flasks

Glass stoppered 500 ml Erlenmeyer flasks or wide mouthed 500 ml Erlenmeyer flasks with petri dishes as cover plates.

5.4 Sample Bottles

Glass bottles with glass or polytetrafluoroethylene lined closures.

5.5 Pipettes — 10.0 and 1.0 ml graduated in tenths.

5.6 Graduated Cylinders — 250, 200, 100, 50 and 25 ml.

5.7 Thermometer — 0–110°C (± 1°C).

5.8 Odour—Free Water Generator — As shown in Fig. 1.

6 REAGENT

6.l Odour-Free Water

Odour free dilution water prepared by filtration of tap or distilled water through a bed of activated carbon. In case tap water is used, check filtered water for residual chlorine, unusual salt concentrations or unusual high or low *p*H values as these may affect odourous samples.

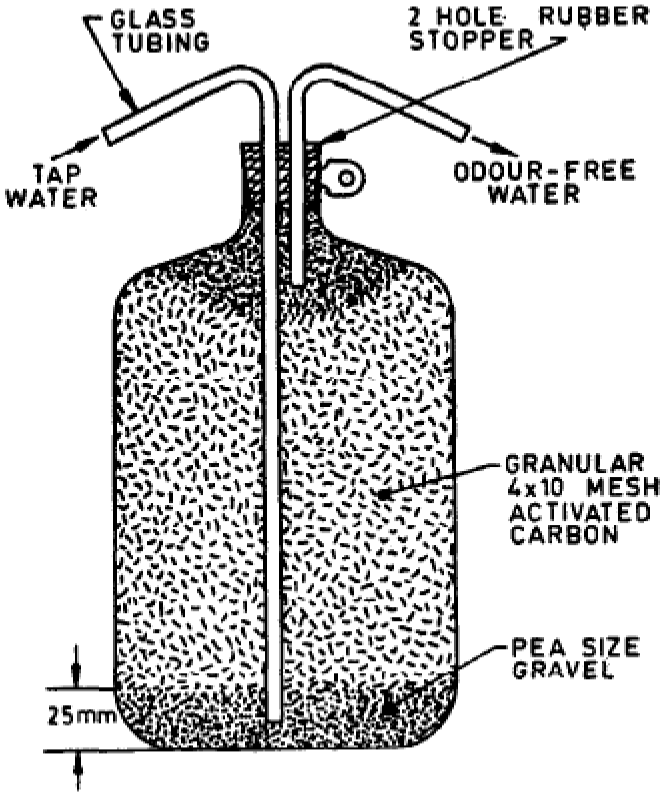

FIG. 1 ODOUR-FREE WATER GENERATOR

Water obtained from odour-free generator should be checked daily at the temperature at which tests are to be conducted (room temperature and/or 60°C).

7 PROCEDURE

7.1 Threshold Measurement

Use a panel of five or more persons for conducting this test. The total volume of sample and odour-free water used in each test should be 200 ml. Put the proper volume of odour-free water into flask first and then add the sample to water. Use Table 1 for dilutions and corresponding threshold numbers.

7.2 Determine approximate range of threshold odour by adding 200, 50 and 12.5 ml of sample to separate 500 ml glass stoppered conical flasks containing odour-free water to make the volume of 200 ml. Use a separate flask containing odour-free water as reference for comparison. If test is to be conducted at 60°C, heat the sample/sample dilutions and reference solution in a constant temperature bath at 60 ± 1°C. Shake the flask containing the odour-free water, remove the stopper and sniff the vapours. Test the sample/sample dilution containing the least amount of odour bearing water in the same way. If odour is detected in this dilution prepare a more dilute sample as given in **7.2.1**. If odour is not detected in the first dilution, repeat the above procedure using the sample/sample dilution containing the next higher concentration of the odour-bearing water and continue this process until odour is clearly detected.

7.2.1 If the sample/sample dilution being tested requires more extensive dilution, prepare intermediate dilutions of sample/sample dilution as shown in Table 1 diluted to 200 ml with odour-free water. Use this dilution for threshold determination. Multiply the T.O. obtained by the appropriate factor to correct for intermediate dilution. In rare cases more than one ten fold intermediate dilution step may be required.

7.3 Based on the results obtained in the preliminary test prepare a set of dilutions with the help of Table 1. Insert one or more blanks in the series in the vicinity of the expected threshold without knowledge of observer.

7.4 Record the observations of each tester on each test flask. If odour is determined, mark the flask with plus sign (+). If no odour is detected, mark the flask with a minus sign (–). For example, match volume of sample diluted to 200 ml against response as given below:

Volume of sample diluted to 200 ml	12.5	0	25	0	50	100	20
Response	–	–	+	–	+	+	+

Table 1 Threshold Odour Number Corresponding to Various Dilutions
(*Clauses* 7.1, 7.2.1, 7.3 *and* 8.1)

Sl No. (1)	Dilution of Sample (2)	Volume Transferred to Odour Flask[1] (3)	Threshold Odour Number (4)
i)	Original sample	200	1
		100	2
		50	4
		25	8
		12.5	16
ii)	Dilution A (25 ml of original sample diluted to 200 ml)	50	32
		25	64
		12.5	128
iii)	Dilution B (25 ml of dilution A diluted to 200 ml)	50	256
		25	512
		12.5	1 024
iv)	Dilution C (25 ml of dilution B diluted to 200 ml)	50	2 050
		25	4 100
		12.5	8 200

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[1] Volume in odour flask made up to 200 ml with odour-free water.

8 CALCULATIONS

8.1 The threshold odour number is the dilution ratio at which odour is just detectable. In the example in **7.4,** the first detectable odour occurred when 25 ml sample was diluted to 200 ml. Obtain threshold value by dividing 200 by 25 which is 8. Alternatively read value from Table 1.

8.2 Sometimes responses are anomalous. A low concentration may be called positive and a higher concentration in the series may be called negative. In such cases, threshold is that point of detection after which no anomalies are there, for example:

Increasing concentration ⟶

Response – – + – + + + +

↓
Threshold

8.3 To find the more acceptable average threshold from large numbers of panels, use statistical methods (generally geometric mean).

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